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(72) Inventors COLIN ALFRED WHITTON

RICHARD JOHN ASHILL

(19)



(54) CLEANING COMPOSITION AND METHOD

(71) We, PYRENE CHEMICAL SERVICES LIMITED, a British Company, of Ridgeway, Iver, Buckinghamshire, do hereby declare the invention, for which we pray that a patent may be granted to us and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to methods and compositions for cleaning contaminated surfaces.

It is particularly applicable for the cleaning of any non-porous and electrically non-conducting surface. Such surfaces tend to become charged and thereby attract dust electrostatically.

A particularly difficult problem arises in connection with the regular cleaning of plastic transport containers, e.g. trays, used in the packaged food industry in the removal of tenaciously held contaminants. One particularly obstinate source of contamination derives from waxed wrapping papers which deposit films of wax on the trays with which may be incorporated fatty residues and/or baked food products and atmospheric dust. There is therefore a requirement for an efficient method of cleaning such product handling food containers more especially food trays.

In the invention a contaminated surface, especially one of those discussed above, is cleaned by forcibly applying against the surface a spray of an alkaline suspension of finely divided insoluble material in an aqueous solution containing an alkaline substance and a surface active agent. Application of the suspension by spraying from, for example, an aerosol container followed by a separate operation e.g. rubbing with a cloth to remove the soil forms no part of the present invention.

A liquid cleaning composition in accordance with the invention which is of particular value in this method contains up to 5%

by weight of the alkaline substance, up to 3% by weight of the surface active agent and 0.01 to 5% by weight of the finely divided water insoluble solid material, and in this the alkaline material comprises alkali metal compound selected from alkali metal silicates and phosphates and the pH is at least 8.

According to the type of soil to be removed the finely divided water-insoluble material may be an abrasive or some softer material which will provide a wiping action. In general denser materials provide more powerful cleaning whereas lighter materials are easier to maintain in a state of suspension. Choice of material is also influenced by the type of plant and the hydraulic power available. Suitable materials include lime, calcium phosphate, ground nut shells, ground bakelite, pumice, bentonite, carborundum, sand, powered glass, kieselguhr, alumina, magnesia and ground egg shells. Pumice, bentonite and ground egg shells are preferred. The insoluble material is preferably present in the composition in amounts of 0.01 - 5% wt/wt, most preferably about 1%. The total solids (dissolved and undissolved) content of the composition is preferably below 13%, so the insoluble material preferably is less than 38% by weight of the total solids content.

The alkaline material or materials should be selected so as to provide good emulsification of the soil and high suspending power for the finely-divided insoluble material and to render the soil particles in a free-rinsing condition.

They may be present in amount up to 5% wt/wt. The pH of the composition is preferably at least 8. To provide this pH and adequate cleaning properties it is preferred that the alkaline material should be selected from alkaline metal silicates and phosphates.

The surface active agents include non-

ionics, anionics, cationics and are preferably low foaming and biodegradable. Such agents or mixtures of agents may be present in amounts of up to 3%. The optimum amount will depend upon the particular surface active agent and other materials in the composition. It must be such that when the composition is applied it has free rinsing properties, as otherwise satisfactory cleaning is not obtained.

In addition the composition may contain grease solvents either in solution or emulsified. Examples are paraffinic or aromatic hydrocarbons, alcohol, glycols, and glycol esters, as well as those mineral oils and vegetable oils that will dissolve greases.

The composition may also contain a sequestrant, capable of complexing water hardness salts, for example polyhydroxy acids or their alkali metal salts, such as gluconates or polyamino carboxylic acids such as EDTA.

The composition may also contain auxiliary viscosity modifiers or thickening agents to assist in the stabilisation of the finely divided insoluble solid material in suspension and any soil removed from the surface being cleaned.

As thickening or suspending agents may be included carboxy celluloses, acrylamides, acrylates, and polyphosphates.

The composition may also include an anti-static ingredient to delay soiling of the cleaned surfaces by atmospheric dust or the cleaned articles may be given a final rinse in an aqueous solution of an anti-static compound.

Preferred compositions for use in the invention are compositions as described and exemplified in British Patent Specification No. 1,309,092, especially those containing alkali-metal polyphosphates, but including also the insoluble solid material, optionally with, for example, the described thickening or suspending agents, and with an anti-static agent.

The compositions are preferably initially formulated as solid concentrates which may be mixed thoroughly into an appropriate amount of water to provide a cleaning composition preferably having a total dissolved and undissolved ingredient content of 1 to 13, preferably 1.5 to 5 % by weight. Typical solid concentrates contain 5 to 75 % by weight of the water insoluble material, 5 to 75 % by weight of the alkaline material and 0.5 to 20 % by weight of surface active agents.

The compositions may be applied as described in Specification No. 1,309,092 or in Specification No. 1,313,487 by forcible spray application. Spray pressures such as those conventionally used in forced spray washing processes are usually satisfactory. Suitable apparatus includes a container for the com-

position equipped with mechanical or air agitation to keep the composition in a state of suspension. The container preferably has a conical bottom and a discharge outlet at the bottom from which the composition is drawn and forcibly ejected onto the surfaces to be cleaned. The composition is then collected and re-circulated back to the container for re-use.

The use of an alkaline suspension in accordance with the invention is advantageous in that it seems to soften the dirt and thereby assist in its removal by the solids. Where the contamination is of a greasy nature, for example from waxed paper wrappings, or contains edible fats it may act to some extent through saponification. In any event it seems to assist penetration of the soil. The free rinsing property of the composition is important. Removed soil goes into suspension in the composition and thus its redeposition is prevented.

In an example, a dry concentrate is formed of, in parts by weight

sodium metasilicate	0.5 parts	90
trisodium phosphate	0.4 parts	
sodium carbonate	0.6 parts	
potassium salt of fatty acid sulphonate derived from oleic acid	0.25 parts	95
hydroxyethyl cellulose	0.1 parts	
ground egg shells	1.0 parts	

This is then thoroughly mixed into sufficient water to make 100 parts. The resultant working solution is sprayed under conventional high pressure at ambient temperature onto plastic food trays.

Surprisingly it is found that this forcible spray application removed obstinate wax containing film from the surfaces of the trays.

In a comparison, if the process is repeated using the same composition except that the ground egg shells have been omitted, only light surface soiling is removed, the obstinate film remaining intact.

WHAT WE CLAIM IS:

1. A method in which a contaminated surface is cleaned by forcibly applying against the surface a spray of an alkaline suspension of finely divided water-insoluble material in an aqueous solution containing an alkaline material and a surface active agent.

2. A method according to claim 1 in which the contaminated surface is the surface of a plastic container used for the transportation of packaged food.

3. A method according to claim 1 or claim 2 in which the composition contains 0.01 to 5% by weight of the water-insoluble material up to 3% by weight of the surface active agent and up to 5% by weight of the water soluble alkaline material, and in which the alkaline material comprises alkali

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metal compounds selected from alkali metal silicates and phosphates and the composition has a pH of at least 8.

4. A method according to claim 3 in which the composition has been made by diluting in water to give a dissolved and undissolved solids content of from 1 to 13% by weight a dry composition comprising 5 to 75% by weight of the water-insoluble material and 0.5 to 20% by weight of the surface active agent.

5. A method according to any of claims 1 to 3 in which the alkaline material comprises alkali metal polyphosphate.

6. A method according to any preceding claim in which the composition additionally comprises a grease solvent.

7. A method according to any preceding claim in which the composition additionally includes a viscosity modifying or thickening agent.

8. A method according to any preceding claim in which the composition additionally comprises a sequestering agent.

9. A method according to any preceding claim in which the water-insoluble material comprises pumice, bentonite or ground egg shells.

10. A method according to any preceding claim in which the composition additionally includes an antistatic ingredient.

11. A method according to any of claims 1 to 9 in which the surface is subsequently rinsed with an aqueous solution containing an antistatic ingredient.

12. A method according to claim 1 substantially as herein described with reference to the drawing.

13. Articles cleaned by a method according to any preceding claim.

14. A liquid composition suitable for use in the method of claim 1 and which comprises an alkaline suspension of 0.01 to 5% by weight of finely divided water-insoluble material in an aqueous solution containing up to 3% by weight of a surface active agent and up to 5% by weight of water soluble alkaline material, in which composition the alkaline material comprises alkali metal compounds selected from alkali metal silicates and phosphates and the pH of the composition is at least 8.

15. A liquid composition according to claim 14 in which the alkaline material comprises alkali metal polyphosphate.

16. A liquid composition according to claim 14 or claim 15 containing about 1% by weight of the insoluble material.

17. A liquid composition according to any of claims 14 to 16 in which the insoluble material comprises pumice, bentonite or ground egg shells.

18. A liquid composition according to claim 14 substantially as herein described with reference to the Example.

For the Applicants:
GILL, JENNINGS & EVERY,
Chartered Patent Agents,
53/64 Chancery Lane,
London, WC2A 1HN.